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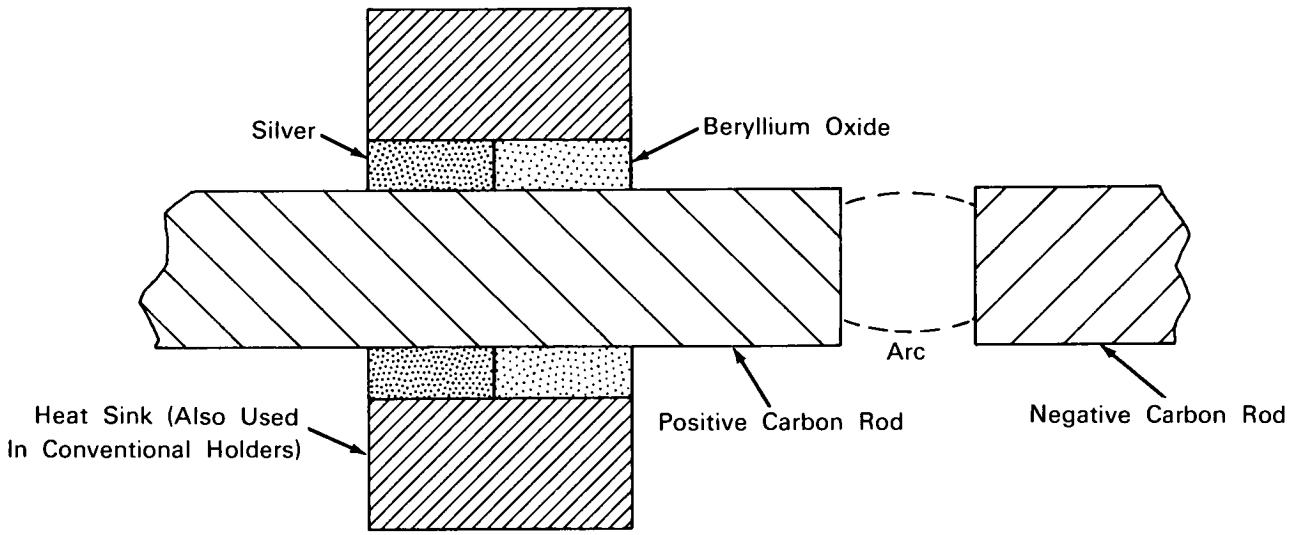
Brief 65-10095

NASA TECH BRIEF

Carbon-Arc Rod Holder Has Long Life, Reduces Arc Splatter



The problem: Preventing nonuniform burning of the positive carbon rod and corrosion of the rod holder in carbon-arc optical systems. The forward portion of the carbon rod is normally at a considerably higher temperature and therefore has a lower electrical resistance (carbon having a negative resistance vs. temperature coefficient) than other portions of the rod. Because of the uneven temperature distribution, the arc splatters and tends to pit the reflector or lens of the optical system. In addition, the electrical path between the front end of the rod and a conventional rod holder (which serves as the positive terminal and also to position and feed the rod) has a lower resistance than the parallel paths between the rear portions of the rod and holder. Therefore a larger electron current flows through the front portion of the rod into the front end of the holder. The localized large current flow corrodes the tip (the first 1/8 inch) of a conventional carbon-rod holder at a faster rate than the rear portions of the holder.

The solution: A carbon-rod holder with front end made of beryllium oxide, which is a refractory material having high electrical resistivity and good thermal conductivity.

How it's done: The holder has a layer of beryllium oxide at the front end, where it comes in contact with the rod nearest the arc, and a layer of silver on the rear end. Because of the large difference in electrical resistivity of these layers most of the current will flow back toward the rear area of the holder into the silver layer. As a result of the better current distribution and thermal conductivity of the beryllium oxide, the front portions of the holder and carbon rod will

(continued overleaf)

operate at a lower temperature than in conventional arrangements and consequently with less tendency to splatter. Also, because of the lower temperature at the front of the rod and the refractory nature of the beryllium oxide, erosion of the holder is minimized.

Note:

Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
Manned Spacecraft Center
P.O. Box 1537
Houston, Texas, 77001
Reference: B65-10095

Patent status: NASA encourages commercial use of this innovation. No patent action is contemplated.

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